

IN THE CLAIMS:

Please substitute the original claims 1-65 with the following claims as outlined:

- A⁴
1. A synthetic middle distillate cut comprising more than 50 mass% paraffins lighter than C₁₆ and in which more than 50 mass% of all paraffins of the middle distillate cut are isoparaffins, and wherein the isoparaffins are predominantly methyl and/or ethyl and/or propyl branched.
 2. A synthetic middle distillate cut as claimed in claim 1, wherein the gradient of an isoparaffins to n-paraffins mass ratio profile of the synthetic middle distillate cut increases from about 1:1 for C₈ to 8.54:1 for C₁₅ and decrease again to about 3:1 for C₁₈.
 3. A synthetic middle distillate cut as claimed in claim 1, wherein a fraction of the synthetic middle distillate cut in the C₁₀ to C₁₈ carbon number range has a higher ratio of isoparaffins to n-paraffins than a C₈ to C₉ fraction of the synthetic middle distillate cut.
 4. A synthetic middle distillate cut as claimed in claim 3, wherein the isoparaffins to n-paraffins mass ratio of the C₁₀ to C₁₈ fraction is between 1:1 and 9:1.
 5. A synthetic middle distillate cut as claimed in claim 3, wherein a C₁₉ to C₂₄ fraction of the middle distillate cut has a mass ratio range of isoparaffins to n-paraffins of from 3.3:1 to 5:1.
 6. A synthetic middle distillate cut as claimed in claim 5, wherein the C₁₉ to C₂₄ fraction of the middle distillate cut has a mass ratio range of isoparaffins to n-paraffins of between 4:1 and 4.9:1.
 7. A synthetic middle distillate cut as claimed in claim 3, which comprises 30 mass% of a straight run component thereby selecting the isoparaffins to n-paraffins mass ratio of the C₁₀ to C₁₈ fraction to between 1:1 and 2:5:1.
 8. A synthetic middle distillate cut as claimed in claim 3, which comprises 20 mass% of a straight run component thereby selecting the isoparaffins to n-paraffins mass ratio of the C₁₀ to C₁₈ fraction to between 1.5:1 and 3:5:1.

067466-06001
T.03030-03026
A4

9. A synthetic middle distillate cut as claimed in claim 3, which comprises 10 mass% of a straight run component thereby selecting the isoparaffins to n-paraffins mass ratio of the C₁₀ to C₁₈ fraction to between 2.3:1 and 4.3:1.
10. A synthetic middle distillate cut as claimed in claim 3, wherein the isoparaffins to n-paraffins mass ratio of the C₁₀ to C₁₈ fraction having substantially only a hydrocracked component is between 4:1 and 9:1.
11. A middle distillate cut as claimed in claim 1, wherein at least some of the isoparaffins are di-methyl branched.
12. A middle distillate cut as claimed in claim 1, wherein at least 30 mass% of the isoparaffins are mono-methyl branched.
13. A middle distillate cut as claimed in claim 1, wherein at least some of the isoparaffins are ethyl branched.
14. A middle distillate cut as claimed in claim 1, wherein the ratio of isoparaffins to n-paraffins of the middle distillate cut is from about 1:1 to about 12:1.
15. A synthetic middle distillate cut as claimed in claim 14, wherein the isoparaffins to n-paraffins mass ratio is between about 2:1 to about 6:1.
16. A synthetic middle distillate cut as claimed in claim 15, wherein the isoparaffins to n-paraffins mass ratio is 4:1.
17. A synthetic middle distillate cut as claimed in claim 3, having a light fraction in the boiling range 160°C to 270°C wherein the isoparaffins to n-paraffins mass ratio of the light fraction is from 1:2 to 4:1.
18. A synthetic middle distillate cut as claimed in claim 17, having the light fraction in the boiling range 160°C to 270°C wherein the isoparaffins to n-paraffins mass ratio of the light fraction is 2.2:1.
19. A synthetic middle distillate cut as claimed in claim 3, having a heavy fraction in the boiling range 270°C to 370°C wherein the isoparaffins to n-paraffins mass ratio of the heavy fraction is from 4:1 to 14:1.
20. A synthetic middle distillate cut as claimed in claim 19, having the heavy fraction in the boiling range 270°C to 370°C wherein the isoparaffins to n-paraffins mass ratio of the heavy fraction is 21:2.

21. A synthetic middle distillate cut as claimed in claim 1 , wherein the synthetic distillate is derived from one or more FT primary product.
22. A synthetic middle distillate cut as claimed in claim 3, wherein the synthetic distillate is derived from one or more FT primary product.
23. A synthetic middle distillate cut as claimed in claim 5, wherein the synthetic distillate is derived from one or more FT primary product.
24. A diesel fuel composition including from 10% to 100% of a middle distillate cut as claimed in claim 1.
25. A diesel fuel composition including from 10% to 100% of a middle distillate cut as claimed in claim 3.
26. A diesel fuel composition including from 10% to 100% of a middle distillate cut as claimed in claim 5.
27. A diesel fuel composition as claimed in claim 26, including from 0 to 90% of one or more other diesel fuel.
28. A diesel fuel composition as claimed in claim 26, including from 20 to 80% of one or more other diesel fuel.
29. A diesel fuel composition as claimed in claim 28, including at least 20% of the middle distillate cut, the composition having a Cetane number greater than 47 and a CFPP, in accordance with IP 309, below -22°C .
30. A diesel fuel composition as claimed in claim 28, including at least 30% of the middle distillate cut, the composition having a Cetane number greater than 50 and a CFPP, in accordance with IP 309, below -22°C .
31. A diesel fuel composition as claimed in claim 28, including at least 50% of the middle distillate cut, the composition having a Cetane number greater than 52 and a CFPP, in accordance with IP 309, below -25°C .
32. A diesel fuel composition as claimed in claim 28, including at least 70% of the middle distillate cut, the composition having a Cetane number greater than 60 and a CFPP, in accordance with IP 309, below -30°C .
33. A diesel fuel composition as claimed in claim 26, including from 0 to 10% additives.

0978660 060804
108050 399260

14

34. A diesel fuel composition as claimed in claim 33, wherein the additives include a lubricity improver.
35. A diesel fuel composition as claimed in claim 27, wherein one of the other diesel fuels is US 2-D grade diesel fuel.
36. A diesel fuel composition as claimed in claim 27, wherein one of the other diesel fuels is CARB grade diesel fuel.
37. A process for producing a synthetic middle distillate having a Cetane number higher than 70, the process including:
 - (a) separating the products obtained from synthesis gas via a FT synthesis reaction into one or more heavier fraction and one or more lighter fraction;
 - (b) catalytically processing the heavier fraction under conditions which yield mainly middle distillates;
 - (c) separating the middle distillate product of step (b) from a light product fraction and a heavier product fraction which are also produced in step (b); and
 - (d) blending the middle distillate fraction obtained in step (c) with at least a portion of the one or more lighter fraction of step (a), or products thereof.
38. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the catalytic processing of step (b) is a hydroprocessing step.
39. A process for producing a synthetic middle distillate as claimed in claim 38, wherein the catalytic processing of step (b) is a hydrocracking step.
40. A process for producing a synthetic middle distillate as claimed in claim 37, including one or more additional step of fractionating at least some of the one or more lighter fraction of step (a), or products thereof, prior to step (d).
41. A process for producing a synthetic middle distillate as claimed in claim 37, including the additional step of hydrotreating at least some of the one or more light fraction of step (a), or products thereof, prior to step (d).
42. A process for producing a synthetic middle distillate as claimed in claim 39, including the additional step of hydrotreating at least some of the one or more light fraction of step (a), or products thereof, prior to step (d).

A⁴

43. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the one or more heavier fraction of step (a) boils above about 270°C.
44. A process for producing a synthetic middle distillate as claimed in claim 39, wherein the one or more heavier fraction of step (a) boils above about 270°C.
45. A process for producing a synthetic middle distillate as claimed in 43, wherein the one or more heavier fraction of step (b) has a isoparaffins to n-paraffins mass ratio of between 4:1 and 14:1.
46. A process for producing a synthetic middle distillate as claimed in 44, wherein the one or more heavier fraction of step (b) has a isoparaffins to n-paraffins mass ratio of 21:2.
47. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the one or more heavier fraction of step (a) boils above about 300°C.
48. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the one or more lighter fraction boils in the range C₅ to the boiling point of the heavier fraction.
49. A process for producing a synthetic middle distillate as claimed in claim 48, wherein the one or more lighter fraction boils in the range 160°C to 270°C.
50. A process for producing a synthetic middle distillate as claimed in claim 48, wherein the one or more lighter fraction has an isoparaffins to n-paraffins mass ratio of between 1:2 and 4:1.
51. A process for producing a synthetic middle distillate as claimed in claim 50, wherein the one or more lighter fraction has an isoparaffins to n-paraffins mass ratio of 2.2:1.
52. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the product of step (d) boils in the range 100°C to 400°C.
53. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the product of step (d) boils in the range 160°C to 370°C.
54. A process for producing a synthetic middle distillate as claimed in claim 37, wherein the product of step (d) is a diesel fuel which has a CFPP below -20°C.

55. A process for producing a synthetic middle distillate as claimed in claim 54, wherein the product of step (d) is obtained by mixing the middle distillate fraction obtained in step (c) with at least a portion of the one or more lighter fraction of step (a), or products thereof, in a volume ratio selected to provide a diesel fuel having a required specification.
56. A process for producing a synthetic middle distillate as claimed in claim 55, wherein the product of step (d) is obtained by mixing the middle distillate fraction obtained in step (c) with at least a portion of the one or more lighter fraction of step (a), or products thereof, in a volume ratio of between 1:1 and 9:1.
57. A process for producing a synthetic middle distillate as claimed in claim 56, wherein the product of step (d) is obtained by mixing the middle distillate fraction obtained in step (c) with at least a portion of the one or more lighter fraction of step (a), or products thereof, in a volume ratio of between 2:1 and 6:1.
58. A process for producing a synthetic middle distillate as claimed in claim 55 to 60, wherein the product of step (d) is obtained by mixing the middle distillate fraction obtained in step (c) with at least a portion of the one or more lighter fraction of step (a), or products thereof, in a volume ratio of 84:16.